

REMARKS

Entry of this amendment, and reconsideration and allowance of this application, as amended, is respectfully requested.

This amendment is in response to the Office Action dated February 27, 2003. By the present amendment, the claims have been amended to clarify the language thereof, as will be discussed below.

Reconsideration and removal of the 35 U.S.C. § 112, second paragraph, rejection of claims 23 and 25 is respectfully requested. By the present amendment, claim 23 has been amended to clarify that the composite material has a thermal conductivity in a direction of orientation greater than twice the thermal conductivity in a direction perpendicular to The direction of orientation. In other words, the thermal conductivity in the direction of orientation is greater than a thermal conductivity in a direction perpendicular to the direction of orientation. It is respectfully submitted that this language would be clear to one of ordinary skill in the art, and, as such, removal of the rejection regarding claim 23 is respectfully requested.

With regard to claim 25, the language questioned at the end of the claim has been amended to define "wherein said sintered composite material is subjected to plastic working." This is clearly supported by page 14, line 24 of the specification. It is also respectfully submitted that this language would be clear to one of ordinary skill in the art. Accordingly, reconsideration and removal of the 35 U.S.C. § 112, second paragraph, rejection regarding claim 25 is also respectfully requested.

In addition, reconsideration and removal of the claim objection set forth in paragraph 5 and 6 of the Office Action is also respectfully requested. By the present amendment, the minor informalities noted in claim 25 have been corrected, and

claims 20-23 have been made dependent on claim 19 rather than claim 1. Accordingly, removal of the objections regarding these points is earnestly solicited.

Reconsideration and allowance of claims 19-23 over the prior art to Scorey (USP 5,292,478) whether considered alone or in combination with Ishikawa (USP 6,110,577) and Lanzi (USP 4,270,266) is also respectfully requested for the reasons set forth below.

Briefly, the present invention, as claimed, is directed to a composite material containing copper and cuprous oxide (CuO_2), which composite material is sintered. In claim 19, the amount of cuprous oxide is defined as 20-80 vol. %. Claim 24 defines the amount of cuprous oxide as 40-80 vol. % (noting that claim 24 has been amended to define that the composite material is sintered, similar to independent claim 19 and independent claim 25). As discussed on page 14, lines 13-18, providing such a composite material of copper and cuprous oxide with the claimed percentages, and sintering of the composite material, provides a material which has both the desired high thermal conductivity and high structural strength sought by the present invention.

The primary reference to Scorey, on the other hand, does not teach a sintered copper and copper-cuprous oxide composite material. Instead, Scorey provides an end product of copper and molybdenum. More specifically, as noted in the abstract and specification, Scorey provides copper-coated molybdenum particles. In order to form the copper coated molybdenum particles, Scorey does use powdered cuprous oxide which is subsequently reduced copper. Column 4, line 66 et seq. referred to in the Office Action gives an example of a process using 27 % cuprous oxide and 73% molybdenum. As stated in column 5, line 3 et seq., however:

"The blended powders are heated in a hydrogen-containing atmosphere at about 980° C for 45 minutes. The resulting cake of reduced copper and molybdenum was ground to -100 mesh."

In other words, the end product is Scorey does not contain cuprous oxide.

With regard to sintering composite material, Scorey refers to sintering in column 6, lines 61-63, as noted in the Office Action. However, it is important to note that the sintering operation in Scorey takes place after the cuprous oxide has been reduced to copper. In other words, the sintering is performed on the copper-molybdenum composite material, not on the cuprous oxide. Accordingly, although Scorey uses cuprous oxide in the process of forming his desired copper-coated molybdenum product, there is no teaching or suggestion of providing a sintered composite material of copper and cuprous oxide in the reference.

Similarly, the secondary reference to Ishikawa fails to teach or suggest anything to make up for this shortcoming of Scorey regarding providing the claimed sintered composite material of copper and cuprous oxide. Likewise, the secondary reference to Lanzi (USP 4,270,266) provides no teaching or suggestion which would lead one to modify Scorey to arrive at a sintered composite material containing cuprous oxide. Therefore, reconsideration and allowance of claims 19-25 over the cited prior art to Scorey, Ishikawa and Lanzi whether considered alone or in combination is earnestly solicited.

Entry of this amendment is respectfully requested, notwithstanding the finality of the Office Action. In particular, each of the amendments to the claims has been made in response to a requirement set forth in the Office Action. 37 CFR § 1.116 permits entry of amendments after final rejection when they are done solely in response to requirements set forth in an Office Action. In the present instance, the minor amendments to the claims have all been made for purpose of addressing

specific objections or rejection s set forth in the claims. As such, these amendments should not require either further search or substantial further consideration on the part of the Examiner. Therefore, entry of these amendments for purposes of placing the application in condition for allowance is respectfully requested.

In the event that it is determined that the claims are still not in condition for allowance, entry of this amendment for purposes of placing the application in better form for appeal is earnestly solicited. In particular, the present amendment should serve to overcome both the 35 U.S.C. § 112, second paragraph, rejections and the objections to the claims set forth in paragraph 4 and 5, even if the Examiner continues to maintain the prior art rejection. As such, the present amendment will serve to reduce the number of issues for appeal, and, at a minimum, entry of the amendment for this purpose is respectfully requested.

If the Examiner believes that there are any other points which may be clarified or otherwise disposed of either by telephone discussion or by personal interview, the Examiner is invited to contact Applicants' undersigned attorney at the number indicated below.

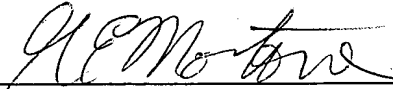
Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The changes are shown on the attached pages, the first page of which is captioned "VERSION WITH MARKINGS TO SHOW CHANGES MADE."

To the extent necessary, Applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in fees due in connection with the filing of

this paper, including extension of time fees, to the Deposit Account No. 01-2135 (Case No. 501.38171X00), and please credit any excess fees to such Deposit Account.

Respectfully submitted,

ANTONELLI, TERRY, STOUT & KRAUS, LLP

By 
Gregory E. Montone
Reg. No. 28,141

GEM/dlt

1300 North Seventeenth Street, Suite 1800
Arlington, Virginia 22209
Telephone: (703) 312-6600
Facsimile: (703) 312-6666

Attachment

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Please **amend** claims 19-25 as follows

19. (Amended) A composite material comprised of copper (Cu) and cuprous oxide (~~Cu₂O~~)(Cu₂O), characterized in that said composite material contains said cuprous oxide in an amount of 20-80vol%, and said composite material is sintered.

20. (Amended) A composite material according to claim 419, wherein said composite material has a coefficient of thermal expansion of 5×10^{-6} to $14 \times 10^{-6}/\text{C}$.

21. (Amended) A composite material according to claim 419, wherein said composite material has a thermal conductivity of 30-325W/m • K in a range of room temperature to 300°C.

22. (Amended) A composite material according to claim 419, wherein said composite material has a coefficient of thermal expansion of 5×10^{-6} to $14 \times 10^{-6}/\text{C}$ and a thermal conductivity of 30-325W/m • K in a range of room temperature to 300°C.

23. (Amended) A composite material according to claim 19,
wherein said composite material has a thermal conductivity in a direction of orientation greater than twice ~~that~~the thermal conductivity in a direction perpendicular to the direction of orientation.

24. (Amended) A composite material comprised of copper(Cu) and cuprous oxide (Cu_2O), characterized in that said composite material contains said cuprous oxide in an amount of 40-80vol%, wherein said composite material is sintered.

25. (Amended) A composite material comprised of metal and inorganic particles,

wherein ~~aid~~said material includes at least one of Au, Ag, Cu and Al,

wherein said inorganic particles includes at least one of copper oxide, tin oxide, lead oxide and nickel oxide,

wherein said composite material is sintered, and

wherein said inorganic particles are dispersed in said composite material, and ~~obtained by plastic working~~wherein said sintered composite material is subjected to plastic working.